Term 3

Grade 11– Core Project

APPLICATIONS OF EXPONENTIAL AND LOGARITHMIC FUNCTIONS

Introduction

Exponential and logarithmic functions apply to many walks of lives. In fact, the applications of these topics are strongly present in science disciplines such as biology and geology. At the conclusion of this project, students should appreciate the use of logarithmic and exponential functions in real-life applications.

Teacher's Name:

Student's Name
1.
2.
3.
4.

Procedures

Due Date: Week 5 (May,12th—May, 16th)

Materials: Pencil, paper, scientific calculator, and computers with Internet access.

Rules

1) Each group consists of four students.

2) Students can present the project as a power point or any other software that supports the graphs and the mathematical calculations.

3) Students should print a hard copy of the project

4) The project should be organized and neat.

5) the project is to be discussed with each group to record the final mark.

Student's learning objectives

The main objective of this project is to assess students' understanding of logarithmic & exponential functions , their properties and equations.

Task1

The Paper Folding Model

Part 1 the number of sections

Fold an 8.5 x 11" sheet of paper in half and determine the number of sections the paper has after you have made the fold.

Record this data in the table and continue in the same manner until it becomes too hard to fold the paper.

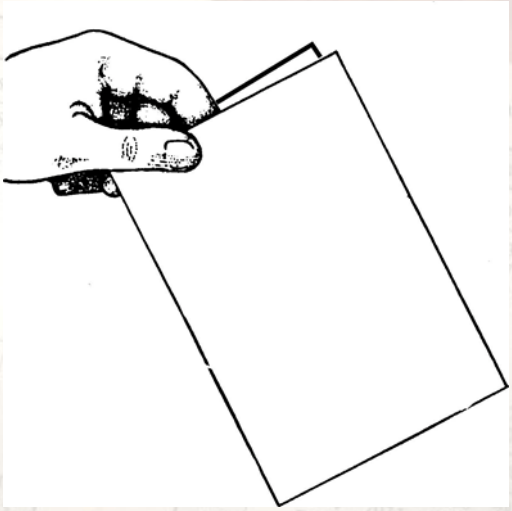
Plot your data.

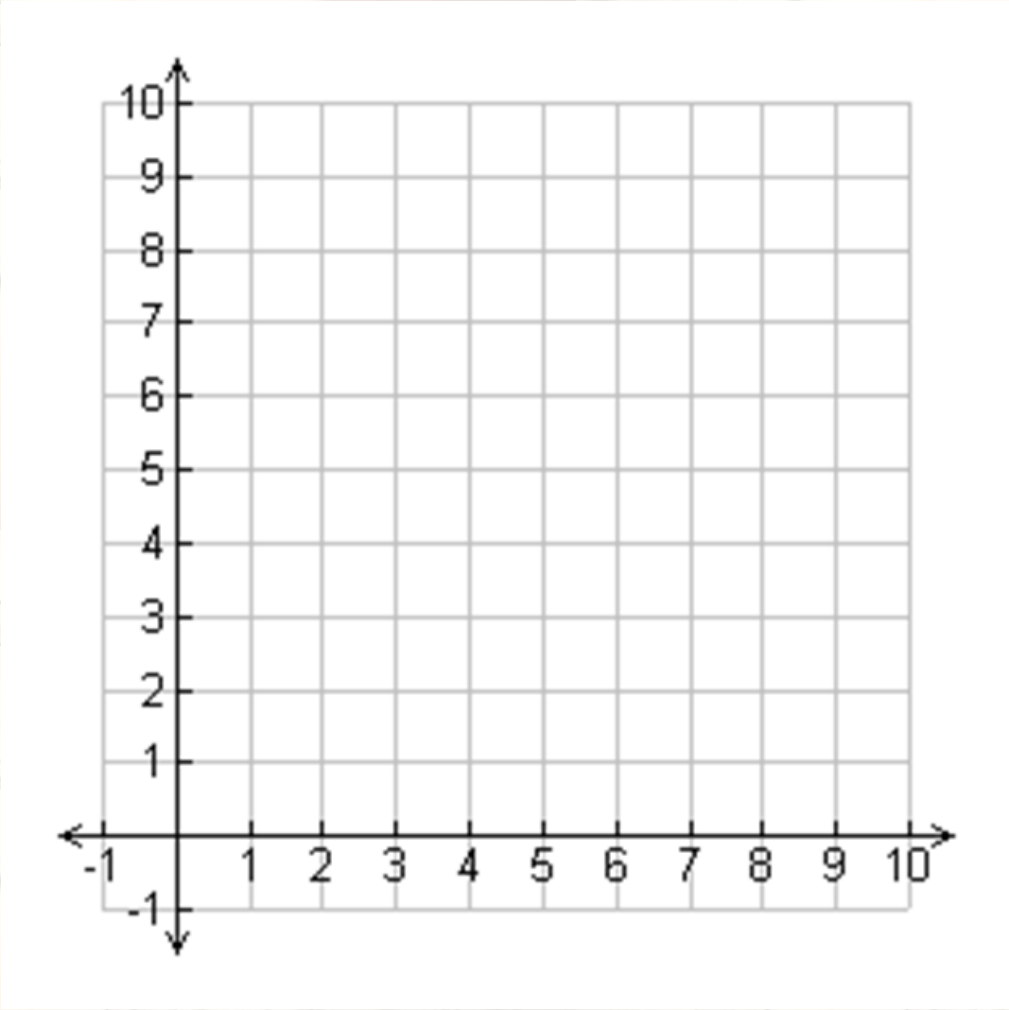
Determine a mathematical model that represents this data by examining the patterns in the table.

What might be different if you tried this experiment with an 8.5 x 11" sheet of wax paper or tissue paper?

Number of Sections

Number of folds	**Number of Sections**
0	
1	
2	
3	
4	
5	
6	




10
9
8
7
6
5
4
3
2
1
-1
1
2
3
4
5
6
7
8
9
10
-1

Part 2 Area of smallest section

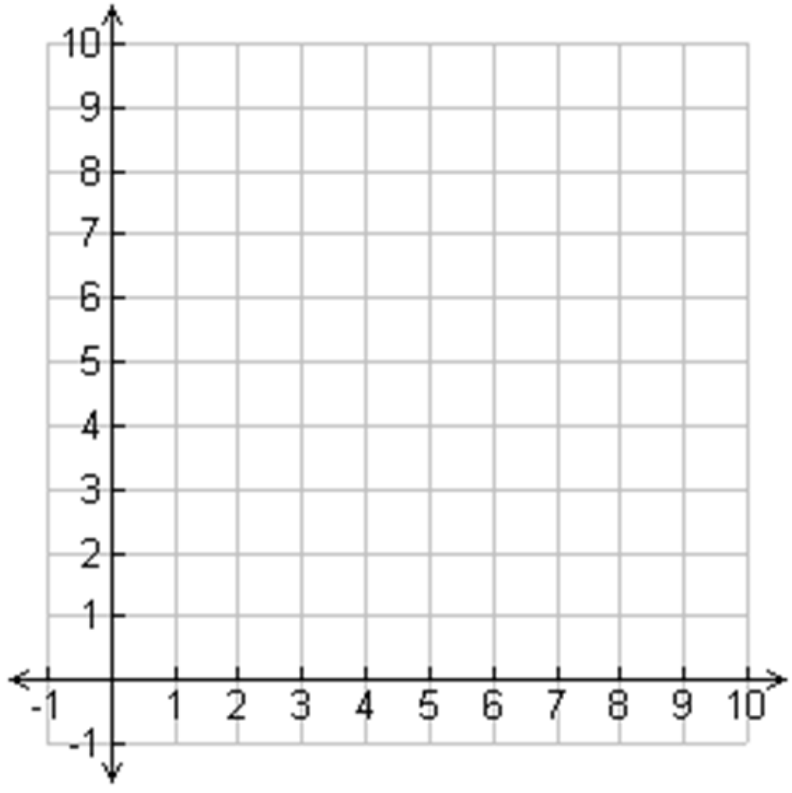
Fold an 8.5 x 11" sheet of paper in half and determine the area of the smallest section after you have made the fold.

Record this data in the table and continue in the same manner until it becomes too hard to fold the paper.

Make a scatter plot of your data.

Determine a mathematical model that represents this data by examining the patterns in the table.

Number of folds	**Area of smallest Section**
0	
1	
2	
3	
4	
5	



Task 2

Your brother tells you a secret. You see no harm in telling two friends. After this second "passing" of the secret, 4 people now know the secret (your brother, you and two friends). If each of these friends now tells two new people, after the third "passing" of the secret, eight people will know. Etc.....

A. Make a table represent this situation then plot its points

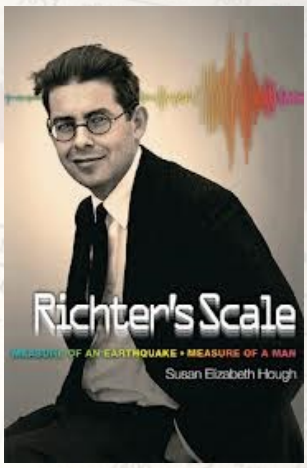
B. Describe the type of function the graph represent.

C. Write an equation that represent the graph

D. If this pattern of spreading the secret continues, how many people will know the secret after 10 such "passings"?

Task 3:

Charles Richter was an American seismologist and physicist. Richter is most famous as the creator of the Richter magnitude scale. In 1935, Charles Richter defined the magnitude of an earthquake to be $M = \log \frac{I}{S}$ where I is the intensity of the earthquake (measured by the amplitude of a seismograph reading taken 100 km from the epicenter of the earthquake) and S is the intensity of a "standard earthquake" (whose amplitude is 1 micron $=10^{-4}$ cm).



The magnitude of a standard earthquake is

$$M = \log \frac{S}{S}$$
$$= \log 1$$
$$= 0$$

Richter studied many earthquakes that occurred between 1900 and 1950. The largest had magnitude of 8.9 on the Richter scale, and the smallest had magnitude 0. This corresponds to a ratio of intensities of 800,000,000, so the Richter scale provides more manageable numbers to work with.

Each number increase on the Richter scale indicates an intensity ten times stronger. For example, an earthquake of magnitude 6 is ten times stronger than an earthquake of magnitude 5. An earthquake of magnitude 7 is $10 \times 10 = 100$ times stronger than an earthquake of magnitude 5. An earthquake of magnitude 8 is $10 \times 10 \times 10 = 1000$ times stronger than an earthquake of magnitude 5.

Question 1:

Early in the century the earthquake in San Francisco registered 8.3 on the Richter scale. In the same year, another earthquake was recorded in South America that was four times stronger. What was the magnitude of the earthquake in South America?

Question 2:

A recent earthquake in San Francisco measured 7.1 on the Richter scale. How many times more intense was the San Francisco earthquake described in question 5?

Question 3:

A recent earthquake in San Francisco measured 7.1 on the Richter scale. How many times more intense was the San Francisco earthquake described in question 9?

RUBRICS

	Criteria	Points

	4	3	2	1	
Completeness of Tasks	Tasks are totally completed and correct. (100%)	Tasks are partially completed, OR Partially wrong.(75%)	Tasks are partially completed, AND Partially wrong (50%).	Tasks are Attempted (25% or less)	____
Presentation and Integration of Technology **14**	Students used one mean of technology. The tool used helped the student and was useful to support his project. Moreover, the student was able to explain the work he/she submitted confidently and fluently; he/she was **able to answer all** of colleagues and instructor's questions	Student used a mean of technology but it was not that supportive to the topic. In addition, student was able to explain the work he/she submitted confidently and fluently and he/she reflected an understanding of his/her works. The student was **able to answer most** of colleagues and instructor's questions.	Student was able to explain the work he/she submitted. Student reflected a shallow understanding of his/her work; she was **able to answer some** of colleagues and instructor's questions,	Student use of technology was primitive and way below the level of other IAT students. Student was unable to explain the work he/she submitted. Student reflected no understanding of his/her work; he/she was **unable to answer any** of colleagues and instructor's questions.	____
Creativity& enrichment **2**	Student had an outstanding addition in **all aspects** of his/her project.	Student had an outstanding addition in **some aspects** of his/her project.	Student had an outstanding addition in **very few aspects** of his/her project.	Student had an outstanding addition in **no aspects** of his/her project.	____
This rubric is out of 20.				**Total----->**	____